

HOUSTON/GALVESTON REGIONAL



# ***2014 HURRICANE GUIDE***





# Introduction

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Hurricanes can bring damaging winds, devastating storm surge, flooding rains and tornadoes to the Texas coast as storms like Ike, Alicia, Carla and many others have shown. Because of this, hurricanes are likely the greatest natural threat to residents of Southeast Texas. The 1900 Galveston Hurricane remains the deadliest hurricane on record for the United States with an estimated 8000 fatalities. A storm doesn't have to reach hurricane strength to have a great impact as Tropical Storm Allison showed in 2001 with its extreme rainfall and flooding. The Atlantic hurricane season was relatively quiet in 2013, but a number of powerful storms developed in the western Pacific, including Typhoon Haiyan which killed over 8000 people in the Philippines.

This hurricane guide is intended to orient you with the different hurricane hazards and how to best be prepared. You'll find tips on what to do before the hurricane season, what to do if a storm is approaching, and what to consider after the storm has passed. Inside you'll see maps showing the different hurricane evacuation zones based zip code, and recommended evacuation routes should you need to evacuate. You'll also learn of the importance of preparing an emergency kit and what should be included. There are checklists on how best prepare and be safe should the next big storm hit our area.

Many cities and towns also hold hurricane workshops or town meetings which are also a great way to get hurricane preparedness and safety-related information and to ask questions. A version of this guide will be handed out at the Houston/Galveston Regional Hurricane Workshop on May 31st at the George R. Brown Convention Center and at numerous other workshops and town meetings across the area. An electronic version will be found on our website, <http://weather.gov/houston>. I'd encourage you to share the information with friends and family members.

Sincerely,

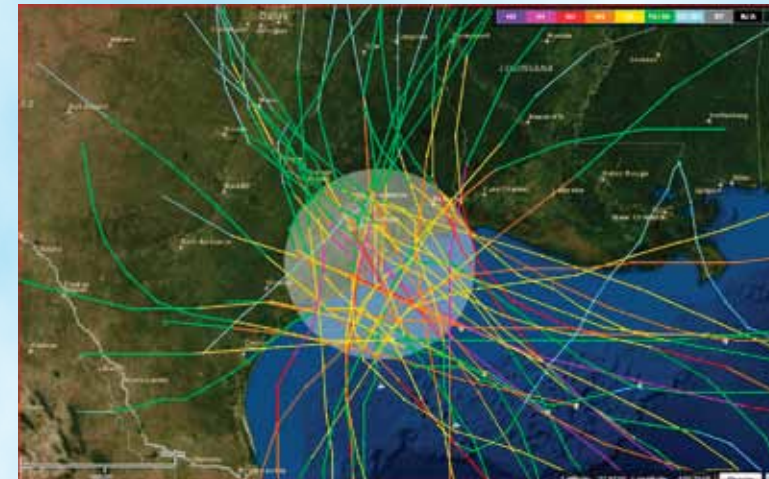


Daniel Reilly  
Warning Coordination Meteorologist  
National Weather Service Houston/Galveston

Graphic design courtesy of:



## About the Hurricane



**Above:** Hurricanes (41) that have passed within 100 miles of Galveston since 1851. Colors indicate category of storm. That is about one every 4 years on average. NOAA

A tropical cyclone is an organized weather system with a closed circulation that forms over warm tropical waters. These cyclones rotate counter-clockwise in the Northern Hemisphere. The cyclone is described as a depression, tropical storm or hurricane depending on the strength of the winds. The peak threat of a hurricane landfall for the Texas coast is from August to September although over the past 150 years hurricanes have struck the Upper Texas coast during every month from June to October.

## Definitions to Know

**TROPICAL DEPRESSION:** A tropical cyclone with maximum sustained winds of 38 mph or less.

**TROPICAL STORM:** A tropical cyclone with maximum sustained winds between 39 and 73 mph

**HURRICANE:** An intense tropical cyclone with sustained winds of 74 mph or higher.

**TROPICAL CYCLONE:** An organized weather system with a closed circulation that forms over warm tropical waters. These systems rotate counter-clockwise in the Northern Hemisphere.

**HURRICANE/TROPICAL STORM WATCH:** Hurricane or Tropical Storm conditions are possible in the watch area within 48 hours

**HURRICANE/TROPICAL STORM WARNING:** Hurricane or Tropical Storm conditions are expected in the warning area within 36 hours.

## Saffir Simpson Hurricane Wind Scale

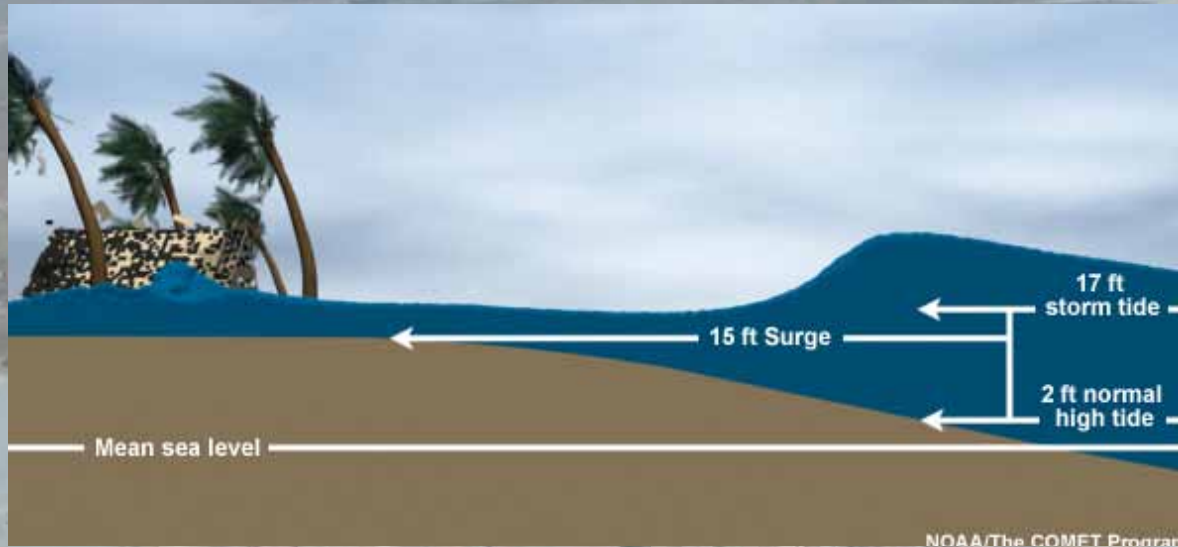
- |              |                      |              |                            |
|--------------|----------------------|--------------|----------------------------|
| ● Category 1 | Winds 74 to 95 mph   | ● Category 4 | Winds 130 to 156 mph       |
| ● Category 2 | Winds 96 to 110 mph  | ● Category 5 | Winds greater than 156 mph |
| ● Category 3 | Winds 111 to 129 mph |              |                            |

<http://www.nhc.noaa.gov/aboutsshws.shtml>



# Storm Surge

Storm surge is the abnormal rise of water generated by a storm, over and above the predicted astronomical tides. Storm Tide is defined as the water level rise due to the combination of storm surge and the astronomical tide. The height of the waves adds on to the storm tide so an 8 foot wave crest on a 17 foot storm tide can lead to a water level height of 25 feet! The combination of storm surge floodwaters and battering waves can be very destructive as seen with many Texas Hurricanes like Ike (2008), Carla(1961), the 1900 Galveston Storm among others. The flood waters from storm surge can penetrate well inland in some cases depending on the elevation of the coastal plain. If the storm tide is greater than the land elevation (even if well inland) then storm surge flooding will be possible. In some cases Ike produced storm surge flooding greater than 20 miles inland.



## Storm Surge Can be Deadly! Here are 8 Tips to be Ready

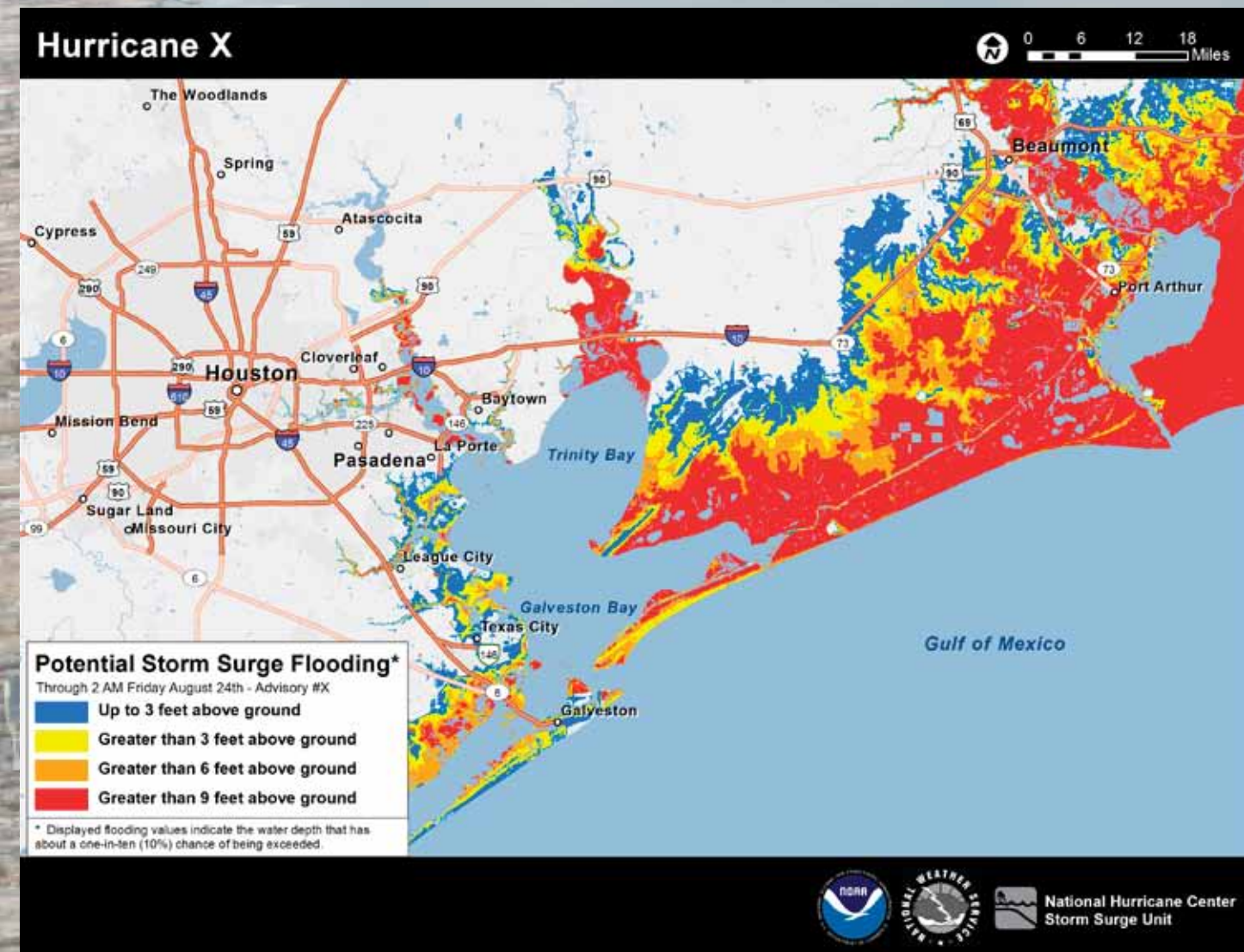
1. Storm surge flooding is often the greatest threat to life and property from a hurricane. It poses a significant threat for drowning. A mere six inches of fast-moving flood water can knock over an adult. It takes only two feet of rushing water to carry away most vehicles-including pickups and SUVs.
2. Storm surge can cause water levels to rise quickly and flood large areas, sometimes in just minutes. You could be left with no time to take action if you haven't already evacuated as instructed.
3. Storm surge depends on more than the category of the storm. These categories (Saffir-Simpson Hurricane Wind Scale) are based on winds and do not necessarily reflect the storm surge threat.
4. Tropical storms and hurricanes of any wind category (1-5) can cause life-threatening storm surge.
5. Many Gulf Coast areas are vulnerable to storm surge including areas many miles inland from the coastline. Find out today if you live in an evacuation zone (see pages 6 and 7 of this guide).
6. Storm surge can occur before, during and after the center of the storm passes through an area, and can sometimes cutoff evacuation routes. The water can rise well in advance of the coming storm, in some cases 36 hours or greater prior to landfall. Do not wait until the last minute to leave when an evacuation is ordered or you may become trapped.
7. During the peak of a storm surge event, it is unlikely that emergency responders will be able to reach you if you are in danger.
8. Your Mayor and/or County Judge could issue evacuation or other instructions for many reasons. Always follow the instructions of these local officials.

More info: [www.hurricanes.gov](http://www.hurricanes.gov) or [www.nhc.noaa.gov/surge](http://www.nhc.noaa.gov/surge)

# New Storm Surge Flooding Map

## New Storm Surge Flooding Map

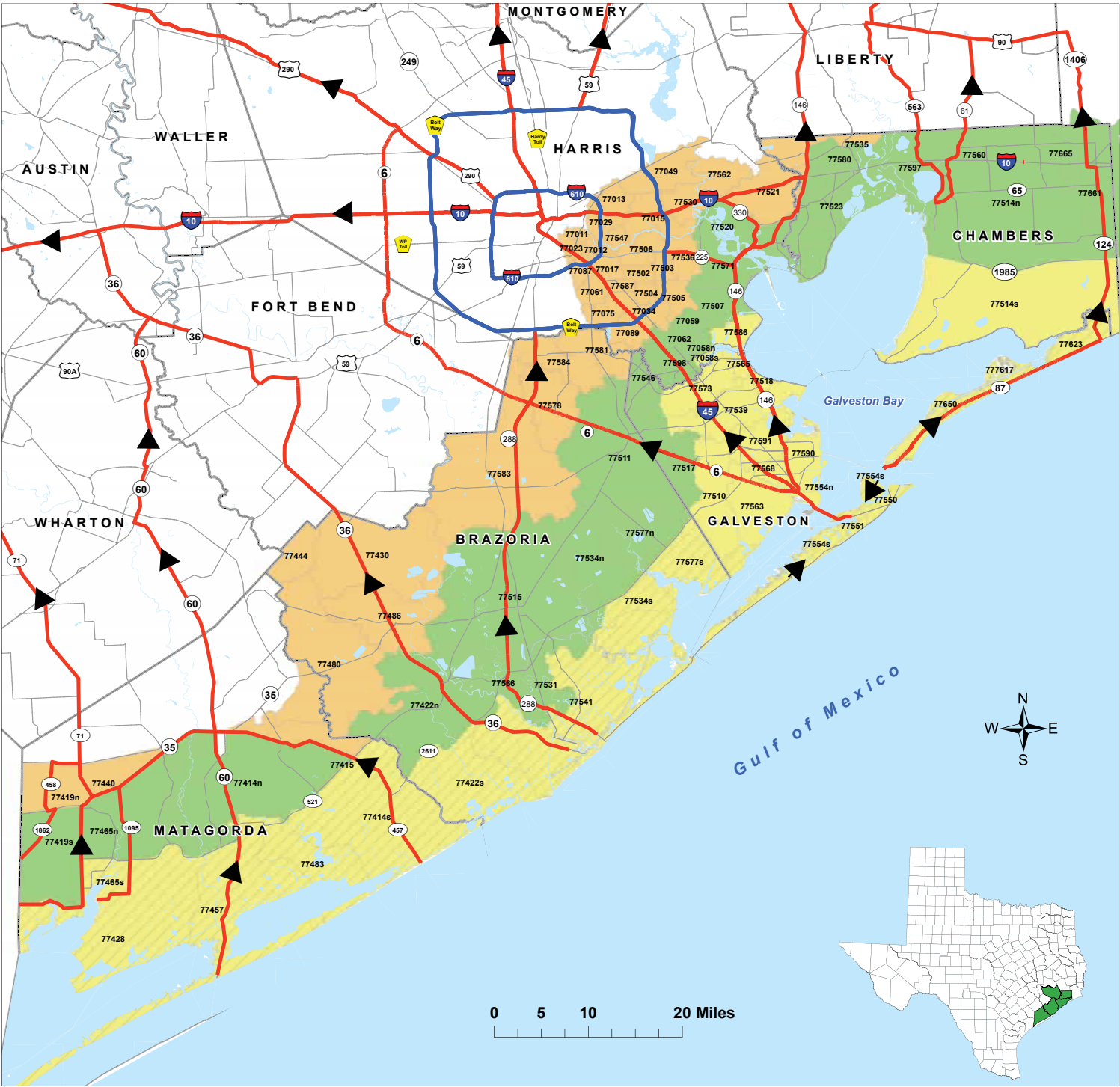
Beginning in 2014, the National Hurricane Center (NHC) will issue a Potential Storm Surge Flooding Map for areas that may be affected by an incoming hurricane. This will normally be issued starting with the watch issuance, approximately 48 hours prior to the arrival of tropical storm force winds or surge. The map will give an idea which areas could be flooded and will show the potential depth of water above ground for the area. Here is an example:



More info: [www.hurricanes.gov](http://www.hurricanes.gov) or [www.nhc.noaa.gov/surge](http://www.nhc.noaa.gov/surge)



# Zip Zone Evacuation



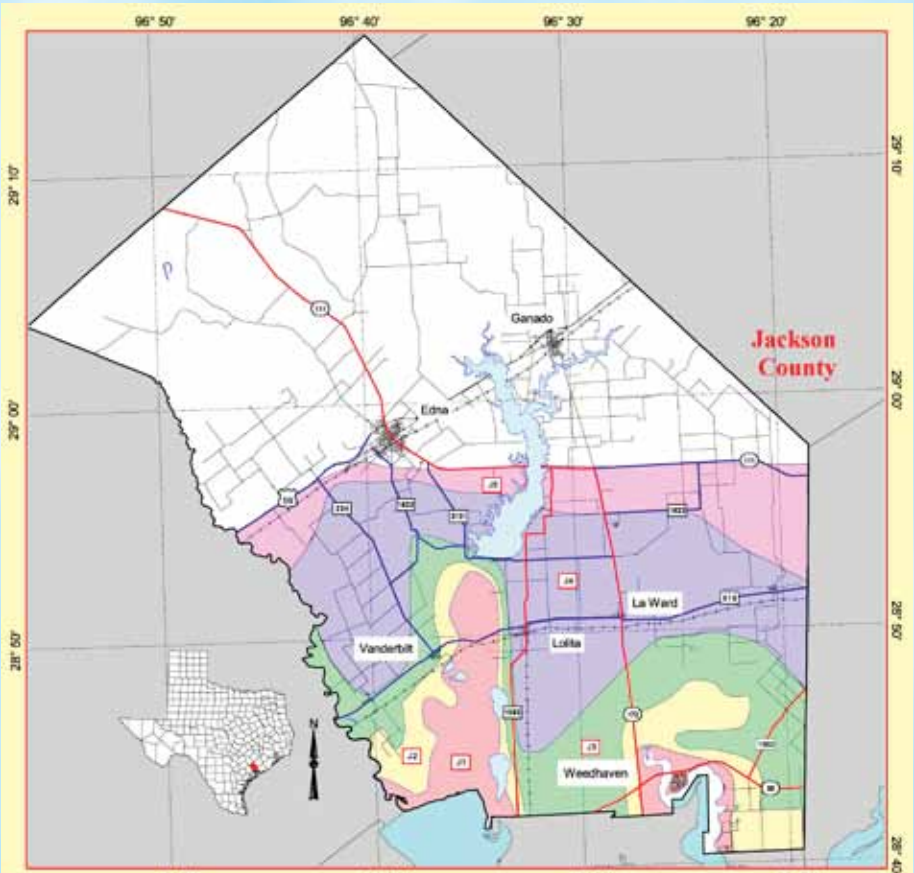
ZipZone evacuation zones roughly correspond to the following hurricane categories. However because surge depends on more than category, this is not always the case. Hurricane Ike was a category 2 but had a surge more like a typical 3 or a 4: Coastal- Cat 1, Zone A-1,2, Zone B-3, Zone C-4,5

## Brazoria, Chambers, Galveston, Harris and Matagorda Hurricane Evacuation Zip-Zones Coastal, A, B, C

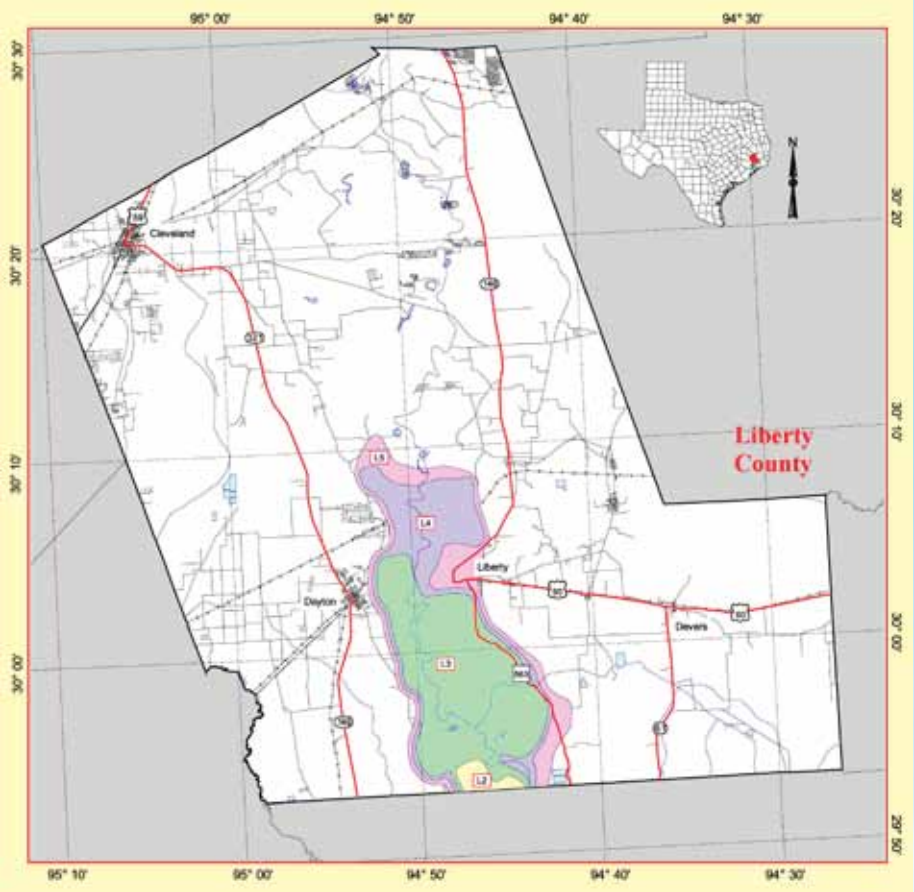
ZIP ZONE COASTAL				
77414s	77415	77422s	77428	77457
77465	77483	77534s	77541	77550
77551	77554s	77563	77577s	77617
77623	77650			
ZIP ZONE A				
77058s	77510	77514s	77518	77539
77554n	77563	77565	77568	77573
77586	77590	77591		
ZIP ZONE B				
77058n	77059	77062	77414n	77415
77419s	77422n	77440	77456	77465n
77507	77511	77514n	77515	77517
77520	77523	77531	77534n	77541
77546	77560	77566	77571	77577n
77580	77597	77598	77661	77665
ZIP ZONE C				
77011	77012	77013	77015	77017
77023	77029	77034	77049	77061
77075	77087	77089	77419n	77430
77440	77444	77480	77486	77502
77503	77504	77505	77506	77521
77530	77536	77547	77535	77562
77578	77581	77583	77584	77587

### Route Designation

- Evacuation Corridors
- Evacuation Connections
- Other Roads
- County Boundary



Different colors/zones roughly correspond to surge flooding for different hurricane categories (J1 corresponds to cat 1, etc). However because surge depends on more than category, this is not always the case.





# Flooding



## Flooding from Heavy Rain

There are numerous examples of significant flooding caused by land-falling tropical cyclones in Texas. Storms with a slow forward motion are the most dangerous as heavy rains persist for a longer period of time. Tropical Storm Allison was such a storm. Allison meandered across Southeast Texas for several days in early June 2001, dumping 35 to 40 inches of rainfall in some areas. These extreme rainfall totals produced devastating flooding, especially across the Houston metropolitan area. Of the 23 deaths attributed to Allison in Texas, 20 were related to persons who drowned while driving or walking through flood waters.

Photo: Harris County Flood Control District

## Five Practical Ways to Protect Yourself and Others From the Dangers of Inland Flooding

- **Protect Your Personal Documents and Special Items**
  - ✓ Store valuables in plastic tubs with locking tops
  - ✓ In case of evacuation, you should be able to secure and move all your valuables within 15 minutes
- **Buy Flood Insurance: A Plan for Replaceable Items**
  - ✓ The National Flood Insurance Program (NFIP) is available from an insurance agent or the NFIP
  - ✓ For more information see [www.floodsmart.gov](http://www.floodsmart.gov)
- **Flood Proof Your Home - Take Steps to Minimize Flood Damage**
  - ✓ Shut off the main circuit breaker to prevent short circuiting and eliminate the threat of electrocution
  - ✓ Raise outside air conditioning units onto platforms above ground level
  - ✓ Store rarely used or expensive items in the attic or on high shelves
- **Develop a Family Flood Plan**
  - ✓ Develop a plan of action to keep from panicking during an emergency
  - ✓ Have an evacuation route and alternatives planned in the event you are asked to evacuate
  - ✓ Communicate your plans with friends or family outside of your home area
  - ✓ Battery powered radios or televisions can be used in the event of a power outage
- **Never Drive on Flooded Roads**
  - ✓ Driving into flooded roadways puts your life and the lives of others at risk
  - ✓ Unless told to evacuate, you are probably safest staying at your current location
  - ✓ If you encounter flood waters when driving, **Turn Around, Don't Drown!**



# Destructive Winds and Tornadoes



Above: Wind damage to home from Hurricane Alicia in August 1983.

Hurricane force winds of 74 mph or more can destroy buildings, mobile homes, trees and power poles. Debris such as signs, roofing material, siding, and small items left outside become flying missiles in a hurricane. The strongest winds occur in a region of the hurricane called the eyewall. Wind gusts in the right side of the eyewall are the most destructive. Hurricane force wind gusts can be felt well inland, far from the coast, especially for stronger fast moving hurricanes.

It is imperative to ensure your home or business is well constructed to minimize the damage from the wind. See the Planning and Preparing section in this guide for cost effective home improvement tips that can help you reduce your damage from a hurricane.



## MOBILE HOME RESIDENTS MUST EVACUATE!

- No mobile home or manufactured home - no matter how new it is - can provide safe shelter from hurricane force winds.
- Straps or other tie-downs will not protect a mobile home from the high winds associated with a hurricane.
- Mobile home residents must evacuate when told to do so by local authorities.



## Tornadoes

Tropical cyclones can also produce tornadoes. These tornadoes most often occur in thunderstorms embedded in rain bands well away from the center of the hurricane; however, they can also occur near the eyewall. Tornadoes produced by tropical cyclones are relatively weak and short-lived, but still pose a threat.





# Planning and Preparing

## Preparing Your Home Before the Storm

Proper hurricane preparations made ahead of time will not completely protect your property from damage. However, following a few simple tips may greatly reduce the damage to your home and property.

**Right:** Hurricane clips attaching roof trusses to side walls.



## Important Home Preparation Tips

### Elevation Matters

- Know the elevation of your home! Are you in a surge, flood and/or evacuation zone?

### Mobile Homes

- Check tie-downs for rust or breakage.
- Residents of mobile homes must evacuate when told to do so!!

### Landscaping

- Trim trees, shrubbery and dead limbs, especially ones close to your home.
- Repair or replace broken or damaged fences.
- Shredded bark is preferred instead of small gravel or stone bedding.

### Roofing

- Inspect the roof for loose tiles, shingles or debris. Consider replacing old or damaged shingles with new ones rated for hurricane force winds.
- Check for and/or install hurricane clips to secure roof trusses to side walls.
- Clear loose and clogged rain gutters and downspouts.

### Doors

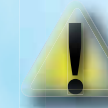
- Reinforce garage doors and tracks or replace with a hurricane tested door. (See above image)
- Reinforce double entry doors with heavy duty foot and head bolts.
- Use a security dead bolt with a one inch minimum bolt length.
- Doors may be shuttered, but one entry must be left easily accessible.

### Windows

- If possible, install tested/manufactured hurricane shutters.
- Inspect existing shutters to ensure they are in good working order.
- Alternative: Use 5/8" or greater exterior grade plywood secured by 2 1/2" screws and/or special clips. Obtain wood and fasteners, cut wood to size, pre-drill holes and place anchors on homes.
- Store shutters or plywood lying flat to avoid warping when not in use.

# Planning and Preparing

## Business and Employee Preparation

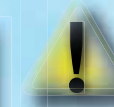


## Tips for Businesses



- Identify and protect vital records. Backup and store key files off site.
  - Protect electronic equipment from possible water damage.
  - Have extra cash and blank checks in case extra money is needed after the storm.
  - Identify a safe room for employees who must remain in the building.
  - Develop a 24-hour emergency contact with phone numbers of key employees.
  - Set up telephone numbers for employees to check in and receive company information.
- Establish a temporary location for business operations in case your facility is damaged.
  - Give employees enough time to secure their homes and families.
  - Consider paying employees before they leave to prepare their homes.

## Protecting Your Boat - Marine Preparations



## Tips for Boat Owners

- Check your marina contract for policies and procedures for hurricanes.
  - Check with the manufacturer for proper ways to secure your boat during a storm.
  - Consider moving arrangements well in advance of an approaching storm.
  - Trailer boats should be removed from the water and securely stored at least 48 hours before a hurricane is expected to make landfall.
- Purchase necessary hurricane materials such as additional mooring lines, crew anchors, fenders, fender boards, chafing gear, and anchors.
  - Safe storm moorings should consist of good condition ropes of sufficient diameter and length, with at least three or four substantial anchor points.
  - Do not moor parallel to bank. Receding tides often capsize boats in this type of anchorage.



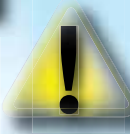
# For Those Needing Extra Assistance

## Preparations for People with Medical, Functional or Access Needs



FEMA News Photo

If you or someone you know have medical, functional or access needs, such as impaired vision, hearing loss, or limited mobility, it is important to make sure there is a support structure in place to help that person respond to a hurricane threat. Such individuals can often benefit from a caretaker or "hurricane helper," someone who can look out for that individual and insure they have the necessary resources to evacuate and/or shelter when the storm threatens.



### Important Tips

- Identify things you need every day such as food, medicines, water and other items you may rely on such as a walker, oxygen tanks or medical equipment. Start building up a supply before the hurricane season of non-perishable food items, bottled water, medicines, etc. that can be used in the event you lose power and/or water supply. Have at least two weeks' supply of food and water, and 1 month supply of medications. If you have vital medical equipment that you rely on that requires power, be sure to have a back-up source of power such as a battery or generator.
- Store important documents in a plastic bag such as prescriptions, emergency contact information for family and doctor, insurance cards, identification etc.
- If evacuation is necessary, identify where you will evacuate to, who you will stay with and how you will get there. If you cannot drive, make sure you have someone designated who will drive you where you need to go in advance of the hurricane. Make sure your transportation can accommodate any equipment or other supplies that need to be taken with you.

## State of Texas Emergency Assistance Registry (STEAR) - Dial 211

If you will need help evacuating from a hurricane or any other hazard, dial 2-1-1 to register in advance. You will be asked a series of questions which will allow emergency managers to identify those who need extra assistance evacuating. It is recommended to do this each calendar year. There will also be an option to register online.

The City of Galveston has a separate "need a ride" number for their residents which is 409-621-3179. Once you register contact your emergency management office (pp.28-30) for more information on what type of assistance will be offered in your jurisdiction.



# Preparing Pets and Livestock

## Preparing for Your Pet's Safety

Your pet should be part of your overall hurricane preparation plans. Below are a few important things to help you prepare:

- Make sure your pet's vaccinations are current and have proof they are current. **DO NOT** assume that a public shelter or hotel will accept your pet.
- Be sure to have a current photo of your pet.
- Each animal should have a properly sized pet carrier. The carrier should be large enough for the animal to stand up and turn around.
- Make sure your pet has a proper ID collar.
- Pack enough food and bottled water for the duration of your evacuation. **DO NOT** let your pet eat food or drink water from outside that may have become contaminated.
- Be sure to pack all medications your pet may need along with a muzzle, collar, leash, paper towels, and trash bags.



## Preparations for Livestock



- Ensure all animals have some form of visible identification.
- Evacuate animals whenever possible. Arrangements for evacuation, including routes and host sites, should be made in advance.
- The evacuation sites should have or be able to readily obtain food, water, veterinary care, handling equipment and facilities.
- Obtain vehicles and trailers needed for transporting each type of animal. Also make available experienced handlers and drivers.
- If evacuation is not possible, a decision must be made whether to move large animals to available shelter or turn them outside. This decision should be determined based on soundness and location of the shelter (structure).
- When necessary, move livestock to higher ground and deny access to flood prone pastures, barns, and other structures.
- It is important that livestock have plenty of food and clean water.



# Insurance Tips

## Insurance Tips - Before the Storm

- Keep a written inventory of your possessions. Take photos or videotape of each room and the exterior of your home to keep with your inventory.
- Gather important documents and insurance cards and policies. Unless they are stored in a safe place, take them with you if you evacuate along with an inventory of your possessions, including receipts and photos or videos.
- Know what your policy covers. Check your auto policy to see if you have comprehensive coverage "other than collision." Comprehensive coverage pays if a storm, fire, or flood damages your car. Find out how much coverage you have for "additional living expenses" to cover lodging, food, and other expenses if you're forced to vacate your residence after suffering a covered loss.
- Know your policy limits. Your limits may be too low if replacement costs have risen because of new additions, improvements, or inflation.
- Review your health coverage. Find out if you'll be able to receive non-emergency care from out-of-network providers, if needed, without accruing additional out-of-pocket costs.
- Consider renters insurance if you don't have it. If you rent an apartment, duplex, house, or townhouse, you may need renters insurance to protect your belongings.
- Consider purchasing flood and wind and hail coverage. You may have to buy separate policies to cover wind, hail, and flood damage. Homeowners, farm and ranch, renters, windstorm, and condominium policies do not cover damage from rising waters.

## National Flood Insurance Program (NFIP)

Homeowners and commercial property policies specifically exclude coverage for damage from flooding from rising waters. To protect yourself from losses caused by most flooding, you'll need to purchase a separate flood insurance policy from the National Flood Insurance Program (NFIP). For more information about flood insurance, contact the NFIP 1-800-638-6620. [www.floodsmart.gov](http://www.floodsmart.gov)

## Texas Windstorm Insurance Association (TWIA)

If your property is located in one of Texas' 14 coastal counties, or parts of southeastern Harris County, you will likely only be able to obtain insurance coverage for windstorm or hail damage from a special insurance pool called the Texas Windstorm Insurance Association (TWIA.) To qualify for TWIA coverage, your property must pass a windstorm inspection and must meet certain windstorm-resistant building standards. You cannot buy or change TWIA coverage once a hurricane has entered the Gulf of Mexico. For more information about windstorm coverage call TWIA or visit its website 1-800-788-8247. [www.twia.org](http://www.twia.org)

## Insurance Tips - After the Storm

Contact your insurance agent or company promptly. Keep a record of all contacts you have with your company. Be prepared to answer questions about the extent and severity of the damage.

If your home is not insured, contact your local Red Cross or FEMA Disaster Recovery Center for assistance. Call FEMA at 1-800-621-FEMA (3362).

Make a list of your damaged property. Photograph or videotape the damage if possible. Don't throw away damaged items until your insurance adjuster has had a chance to view them.

If there is partial damage to your home, take reasonable and necessary repairs to protect your home and property from further damage. Cover broken windows and holes to keep rain out. Don't make permanent repairs until instructed by your insurance company. Keep a record of your repair expenses and save all receipts.

For more information see Texas Department of Insurance web site at [www.tdi.texas.gov](http://www.tdi.texas.gov) or call

**1-800-252-3439 (Consumer Help Line)**  
**1-855-352-6278 (for questions about TWIA claims)**

# Contacts and Disaster Supply Kit

The Greater Houston Area Chapter of the American Red Cross recommends that you have the following items in your Hurricane Supply Kit. Do not forget to have a family meeting before hurricane season and review your communication information and evacuation plan. Make sure the contact information such as home, work, school, cell phone numbers, and your "Out of Town" contact person's information is current.

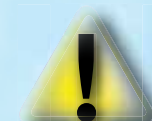


## Emergency Contact Information

Out of Town Contact Address:	
Out of Town Contact Phone Number:	
Work Telephone Number:	
Cell Number/Spouse Cell Number:	
Children Cell Number:	
School Telephone Number:	
Doctor Telephone Number:	
Bank/Credit Card Telephone Number:	
Insurance Company Information:	



## HURRICANE SUPPLY KIT



- At least a 7-day supply of non-perishable food and a manual can opener
- At least a 7-day supply of water. One gallon per person per day is recommended
- Battery powered portable television or radio with extra batteries
- Flashlight with extra batteries
- First Aid kit and manual
- Sanitation and hygiene items such as instant hand sanitizing gel, moist towelettes, toilet paper, and feminine hygiene products
- Matches in a waterproof container
- Whistle
- Kitchen accessories and cooking utensils
- Cash
- Extra clothing, blankets, and sleeping bags
- Photocopies of identification, insurance, prescriptions, household inventory, credit cards, and your latest utility bill
- CD or photocopies of important documents such as birth/marriage certificates and titles
- Prescription medications, eyeglasses, contact lens solution, and hearing aid batteries
- Formula, baby food, diapers, and pacifiers
- Pet carriers, leashes, shot records, and food for each animal evacuating with you
- A good map showing county roads and highways
- Tire repair kit, booster cables, pump, and flares
- White distress flag
- Toys and games for children
- List of family phone numbers and addresses outside the area





## ATLANTIC HURRICANE TRACKING CHART

### Always remember

If you live along the coast or in a low-lying area, if you live in a mobile home in an area subject to hurricane water or wind, or if authorities tell you to... Go!

### Storm Surge

A storm surge is a dome of water often 50 miles wide that comes sweeping across the coastline near the area where the eye of the hurricane makes landfall. The surge, aided by the hammering effect of breaking waves, acts like a giant bulldozer sweeping away everything in its path. Nine out of ten hurricane deaths are caused by storm surge. That's why it's important to leave well before a hurricane may come your way.

### Wind Damage

Hurricane winds can cause significant damage to homes and businesses far from the shore. If you live in an area anywhere near the path of a hurricane, you should take steps to protect property from high winds. Bring in anything from outside that may become airborne in high winds, including toys, lawn chairs, trash cans, coconuts, etc. Cover all windows of your home. If shutters are not installed, use 3/4" marine plywood panels. Tape does not work, so it is not recommended. Remain inside until authorities tell you the danger has passed.

### Other Hurricane Effects

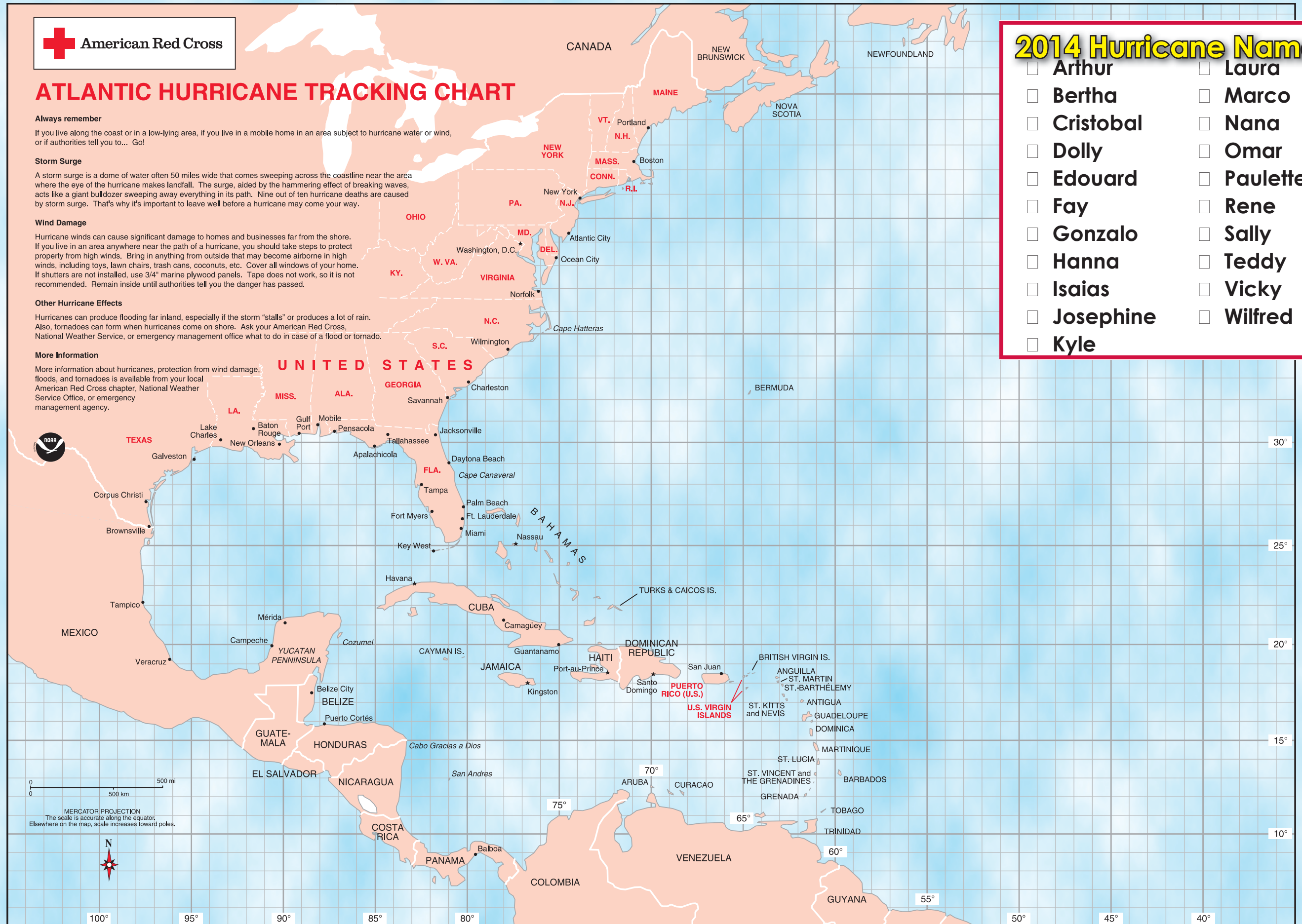
Hurricanes can produce flooding far inland, especially if the storm "stalls" or produces a lot of rain. Also, tornadoes can form when hurricanes come on shore. Ask your American Red Cross, National Weather Service, or emergency management office what to do in case of a flood or tornado.

### More Information

More information about hurricanes, protection from wind damage, floods, and tornadoes is available from your local American Red Cross chapter, National Weather Service Office, or emergency management agency.

## 2014 Hurricane Names

- |                                    |                                   |
|------------------------------------|-----------------------------------|
| <input type="checkbox"/> Arthur    | <input type="checkbox"/> Laura    |
| <input type="checkbox"/> Bertha    | <input type="checkbox"/> Marco    |
| <input type="checkbox"/> Cristobal | <input type="checkbox"/> Nana     |
| <input type="checkbox"/> Dolly     | <input type="checkbox"/> Omar     |
| <input type="checkbox"/> Edouard   | <input type="checkbox"/> Paulette |
| <input type="checkbox"/> Fay       | <input type="checkbox"/> Rene     |
| <input type="checkbox"/> Gonzalo   | <input type="checkbox"/> Sally    |
| <input type="checkbox"/> Hanna     | <input type="checkbox"/> Teddy    |
| <input type="checkbox"/> Isaías    | <input type="checkbox"/> Vicky    |
| <input type="checkbox"/> Josephine | <input type="checkbox"/> Wilfred  |
| <input type="checkbox"/> Kyle      |                                   |





# Hurricane Forecast Resources

The National Hurricane Center (NHC) in Miami, FL is the official source for tropical cyclone advisories and forecasts and is responsible for issuing tropical cyclone watches and warnings for the United States.

## Weather Information

National Weather Service  
[www.weather.gov/houston](http://www.weather.gov/houston)  
National Hurricane Center  
[www.hurricanes.gov](http://www.hurricanes.gov)

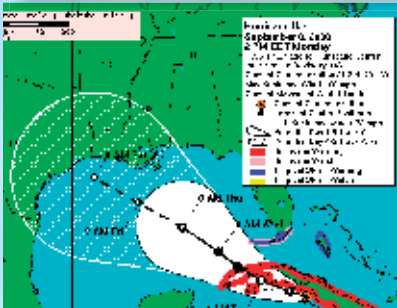


## Graphical Tropical Weather Outlook

- Provides an overview of all tropical cyclone activity.
- Indicates areas of interest where tropical cyclones could develop over next 5 days. A percent chance that it will develop is assigned.
- Moving the cursor over the highlighted areas will provide a more detailed text description.

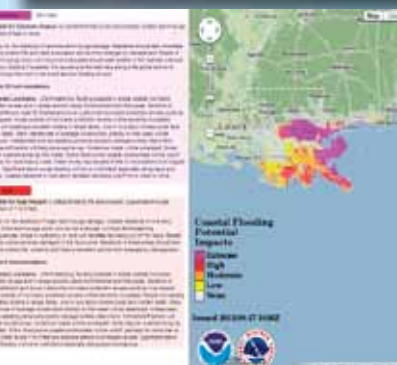
## NHC Forecast Advisory

- Most recent position for a storm along with all coastline watches and warnings. Includes a 3 or 5 day track with error cone.
- Error cone represents a 5 year average error. Storms only stay within the error cone 67% of the time.
- DO NOT focus too closely on the exact track forecast - the little black line. If you are in or near the cone, the center of the storm could head your way. Impacts are often felt outside the cone entirely.



## Tropical Cyclone Potential Impact Graphics

- Colorized maps showing different threat levels for each hazard (damaging winds, storm surge flooding, tornadoes and rainfall flooding)
- Threats levels rated as none, low, moderate, high and extreme. A key or legend explains the meaning of each threat level in terms of expected impacts.
- For more information go to <http://www.weather.gov/tcig>.



## Graphical Hurricane Local Statement (HLS)

- Issued by local NWS offices to summarize local impacts expected from the tropical cyclone.
- A text version of the Hurricane Local Statement is also available from your local NWS office which provides more detailed information on the tropical cyclone's local impacts.



# Final Checklist

## Actions to Take When a Storm is in the Gulf

- Listen frequently to radio, TV, or NOAA weather radio for bulletins and forecasts of the storm's progress.
- Double check items in your emergency supply kit.
- Fuel and service your vehicles.
- Inspect and secure mobile home tie-downs.
- Make sure you have supplies to survive on your own for at least one week if you plan on staying.
- Board up windows (if shutters do not exist) in case storm moves quickly and you have to leave.  
**TAPE PROVIDES NO PROTECTION!**
- Store lawn furniture and other loose, light weight objects, such as garbage cans and garden tools.
- Get plenty of extra cash in case power goes out and ATMs do not work.
- Garage or store vehicles that are not being used.
- Follow instructions issued by local officials. **EVACUATE IMMEDIATELY IF ORDERED TO DO SO!**

## Final Actions to Take if Leaving

- Turn off propane tanks.
- Unplug small appliances.
- Empty refrigerator and freezer.
- Turn off utilities if ordered to do so.
- Notify family members of your evacuation plans.
- Lower water level in swimming pool by one foot.
- Lock home securely.
- Board up remaining doors and brace garage door.
- Take pets with you.



## Final Actions to Take if Staying

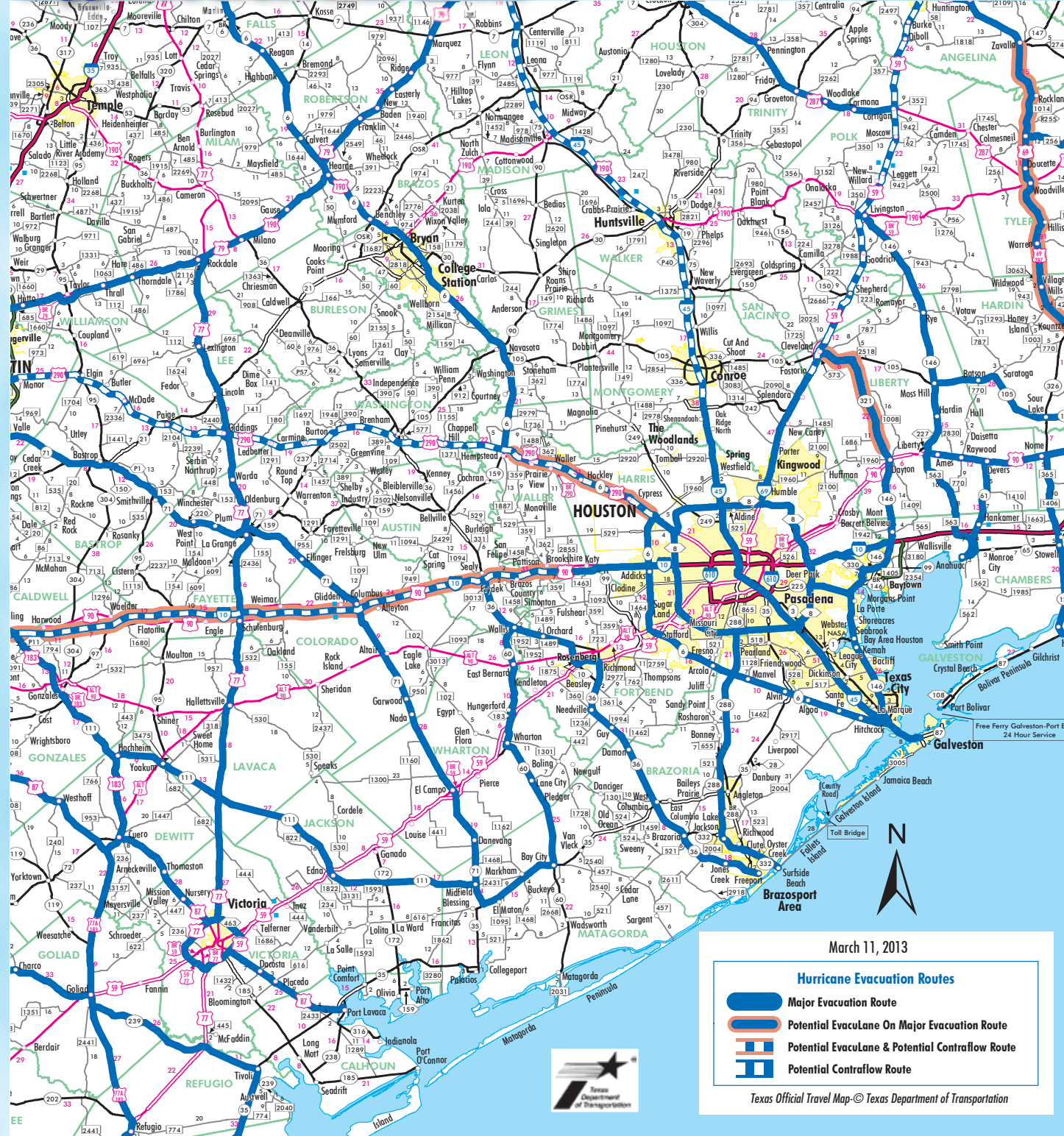
- Close storm shutters.
- Turn refrigerator or freezer to coldest setting and open only if necessary. (25 pounds of dry ice will keep a 10-cubic foot freezer below freezing for 3-4 days.)
- Follow instructions from emergency managers and be prepared to turn off utilities if ordered to do so.
- Board up remaining doors, brace garage door, and remain inside. Stay away from boarded up windows.
- Beware of the calm winds in the eye of the storm and do not venture outside. Some of the strongest winds may occur shortly after the eye passes.
- DO NOT EXPECT EMERGENCY RESPONDERS TO BE OF ANY ASSISTANCE DURING A LANDFALLING HURRICANE!**





# Evacuation

## Suggested Evacuation Routes



# Evacuation

Evacuees need to consider the projected path of the hurricane when choosing an evacuation route and destination. Evacuation studies estimate that it takes between 23 and 42 hours to evacuate southeast Texas in advance of tropical storm force winds. This underscores the need for coastal residents to have an evacuation plan. When evacuating, be sure to check local weather and highway conditions before departing. When local authorities order an evacuation of your area, leave immediately!



## Texas Road Information

TXDOT Road Conditions

1-800-452-9292 or [www.txdot.gov](http://www.txdot.gov)

TXDOT Houston Office

1-713-802-5074



## Final Actions before Evacuating

- Follow evacuation orders provided by your local officials. Once the evacuation order has been given, LEAVE IMMEDIATELY!
- Take your Hurricane Supply Kit with you (as described on page 15).
- Leave as early as possible to avoid heavy traffic and hazardous weather.
- See TXDOT map on the previous page for an illustration of primary and alternate evacuation routes. Remember that the primary routes often become congested quickly.
- Do not stay in a mobile home near the coast under any circumstance.
- Prepare to stay at your evacuation destination for a week or more if necessary, as re-entry into the affected area may be restricted.



# Returning Home



**IF YOU EVACUATED THE AREA, WAIT FOR AN ALL CLEAR FROM THE CITY OR COUNTY BEFORE ATTEMPTING TO RETURN TO YOUR HOME. BE PREPARED TO SHOW PROOF OF RESIDENCE BY HAVING A COPY OF YOUR LATEST UTILITY BILL.**



FEMA News Photo



## General Cleanup

- Be cautious of structural damage and downed power lines. Do not attempt to move structural supports or large pieces of debris.
- DO NOT run power generators indoors. Inhalation of carbon monoxide from the exhaust can cause death. Ensure exhaust is well ventilated.
- DO NOT use open flames indoors.
- Restrict your driving to emergency use only. Road conditions may not be safe until road debris is cleared.

FEMA News Photo



## Debris Cleanup

- Cities and counties will publish a schedule for debris pick-up and removal. Debris cannot be removed from private property.
- Construction materials, vegetative debris, household hazardous waste and household appliances will need to be placed into separate piles and moved to the curbside for pick-up.

FEMA News Photo



## Water

- Listen for instructions regarding public water supply. Use only bottled, boiled or treated water until you know that your water supply is safe.
- You can purify water by boiling for one minute then letting it cool before drinking.

# Returning Home

## Utility Cleanup

FEMA News Photo



- Check for gas leaks. If you smell or hear gas leaking, leave immediately. DO NOT use the phone or turn on lights in your home. Call the gas company from a neighbor's phone.
- Report any visible damage of power lines to the electric company. Turn off power at main breaker if any electrical equipment or circuits have been exposed to water.
- DO NOT connect generators to your home's electrical circuits. If a generator is on line when electrical service is restored, it can become a major fire hazard. Also, line workers working to restore power will be endangered if a generator is hooked up to the home's circuits.
- It is likely that an electric company other than your own will reconnect the lines to your home; however, they can not turn the service back on. Only your electric company can actually turn the power back on to your house.

## Sewage Cleanup

- If you suspect water or sewage lines are damaged, do not use your plumbing (toilets, sinks, etc.). Contact the water company or a plumber for repairs.
- A chemical portable commode can be created by the following:
  - ✓ Use 5 gallon buckets with tight lids, lined with heavy duty plastic garbage bags.
  - ✓ Add kitty litter to the bucket as a disinfectant and deodorizer. Keep lids on firmly.
  - ✓ Keep buckets in a cool, dark place. Clean and disinfect buckets immediately.
- Your toilet can also be used by flushing until the bowl has no water. Then, line with heavy duty trash bags and disinfect with chlorine bleach after each use. Remove waste to an outside location.
- If significant sewer outages have occurred, instructions for disposal of human wastes will be announced.
- DO NOT dispose of human waste through your regular trash!

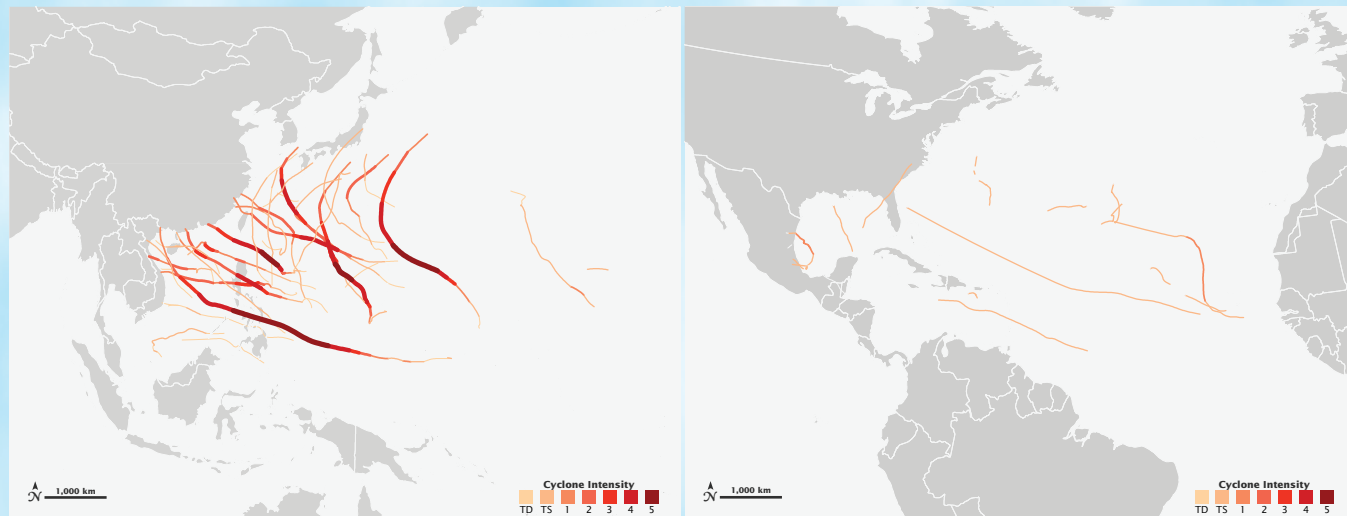
## Interior Cleanup

- Disinfect and dry interior buildings and items inside. This will prevent growth of some bacteria, viruses, mold, and mildew that can cause illness.
- Clean walls, floors, and counter tops with soap and water. Disinfect them with a solution of 1 cup of bleach to 5 gallons of water.
- Wash all clothes and linens in hot water. Air dry and spray all unwashable items with disinfectant. Steam clean carpets. Throw away all items touched by water that cannot be disinfected.



# Super Typhoon Haiyan

While the Atlantic was relatively quiet in 2013, the Western Pacific Basin had a number of very strong tropical cyclones, or typhoons as they are called in the Western Pacific. Figure 1 shows the tropical cyclone tracks in each basin but with line color and width indicating storm category on the Saffir-Simpson Hurricane Wind Scale. You can see the Western Pacific had several tropical cyclones of category 4 or higher while the Atlantic had only two hurricanes with no major hurricanes (cat 3 or higher). One of the strongest and most devastating storms was Typhoon Haiyan which struck the Philippines November 7<sup>th</sup>, 2013.



**Tropical cyclone tracks in the Western Pacific and Atlantic for 2013. Storm wind speed or intensity is indicated by color and width of the line (courtesy of NASA).**

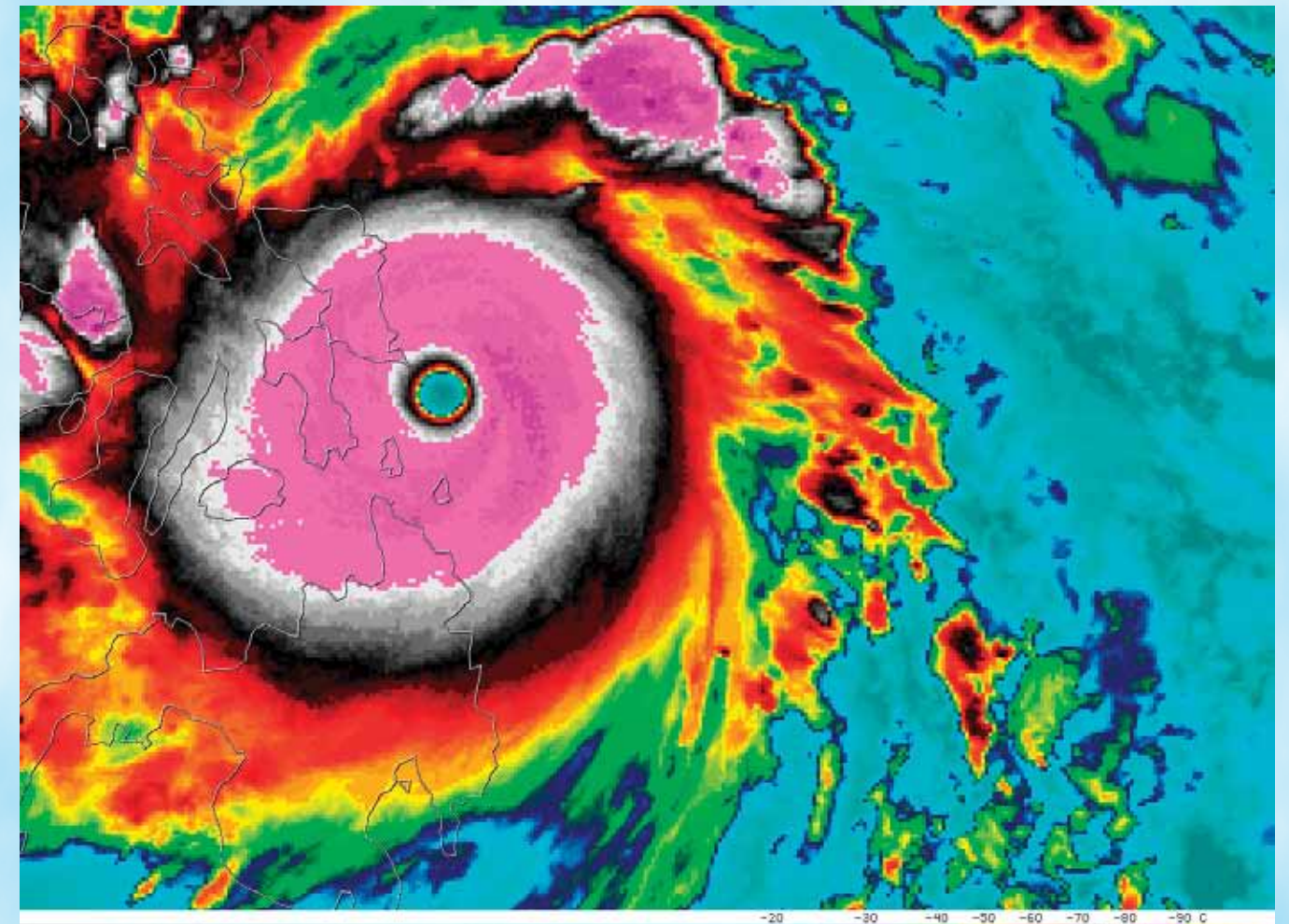
Haiyan was one of the strongest tropical cyclones on record, the equivalent of a category 5 hurricane on the Saffir-Simpson Hurricane Wind Scale, making landfall with winds close to 195 mph. The track of the storm and shape of the coastline contributed to a storm surge in excess of 20 feet over portions of the Philippines coast, with an estimated 8000 people dead or missing, an additional 30,000 injured and over 4 million people displaced from their homes.<sup>1</sup> The most deadly hazard was the storm surge which produced flooding along the southeast coast of the Philippines, including a heavily populated area around Tacloban City. Many of the survivors had anticipated the wind but expressed surprise at the power and extent of the storm surge, which came in with such speed and force some survivors compared it to a tsunami.<sup>2</sup>

Haiyan once again demonstrated the destructive and deadly nature of storm surge and how, at times, the danger of storm surge can be underestimated. Southeast Texas has observed the power of storm surge first hand with storms like Hurricanes Ike and Carla, the 1900 Galveston Storm and many others. Still, some were caught offguard by the surge when Ike devastated the Bolivar Peninsula, and severely impacted Galveston and many other coastal communities. As floodwaters rose ahead of Hurricane Ike, many on the Bolivar Peninsula were stranded with their escape routes cut off more than 24 hours prior to the landfall. If not for the heroic efforts of the U.S. Coast Guard and National Guard, who airlifted 635 people off that barrier island ahead of the storm, the death toll would have undoubtedly been much higher. Many homes on Bolivar were totally swept away with only the slab remaining.

<sup>1</sup> Situation Report No. 104, Effects of Typhoon Yolanda (Haiyan), National Disaster Risk Reduction and Management Council, 29 January 2014.

<sup>2</sup> "Killer Typhoon," NOVA. WGBH, 22 January 2014.

# Super Typhoon Haiyan



**Infrared Satellite Image of Haiyan provided courtesy of Cooperative Institute for Meteorological Satellite Studies, Univ. of Wisconsin-Madison.**



**Aerial photos taken after Ike moved across Bolivar Peninsula. Before Ike, this barrier island was covered in homes and vegetation. Most homes were severely damaged or completely swept away.**



# 2013 Season Review / Hurricane Sandy

The 2013 Atlantic Hurricane season featured 13 named storms with just two developing into hurricanes. Neither of the two hurricanes was a “major hurricane” meaning they did not reach category 3 on the Saffir-Simpson Hurricane Wind Scale. There was only one U.S. landfall of a tropical cyclone, Tropical Storm Andrea, which made landfall on the northwestern coast of Florida on June 6<sup>th</sup>. The storm produced a modest storm surge (1-3 feet) and rainfall (mainly 3 to 5 inches) although isolated totals of around 15 inches occurred near Miami where severe urban flooding occurred.<sup>1</sup> The storm with the closest approach to Texas was Hurricane Ingrid which formed in the Bay of Campeche on September 12<sup>th</sup>, then tracked northwest then west into northeastern Mexico. It is estimated that 23 people died from the flooding and mudslides caused by Ingrid’s heavy rain.<sup>2</sup> Although Texas did not have a landfall, one other storm did have an impact locally. Tropical Storm Karen formed near the tip of the Yucatan Peninsula on October 3<sup>rd</sup> then tracked northwestward out over the central Gulf of Mexico. Due to high shear the storm dissipated before making landfall. However the long-period waves or swell generated by Karen did increase surf and rip currents along the Texas coast. This effect is believed to have contributed to the deaths of two fishermen who were swept away while wade fishing near Bryan Beach.

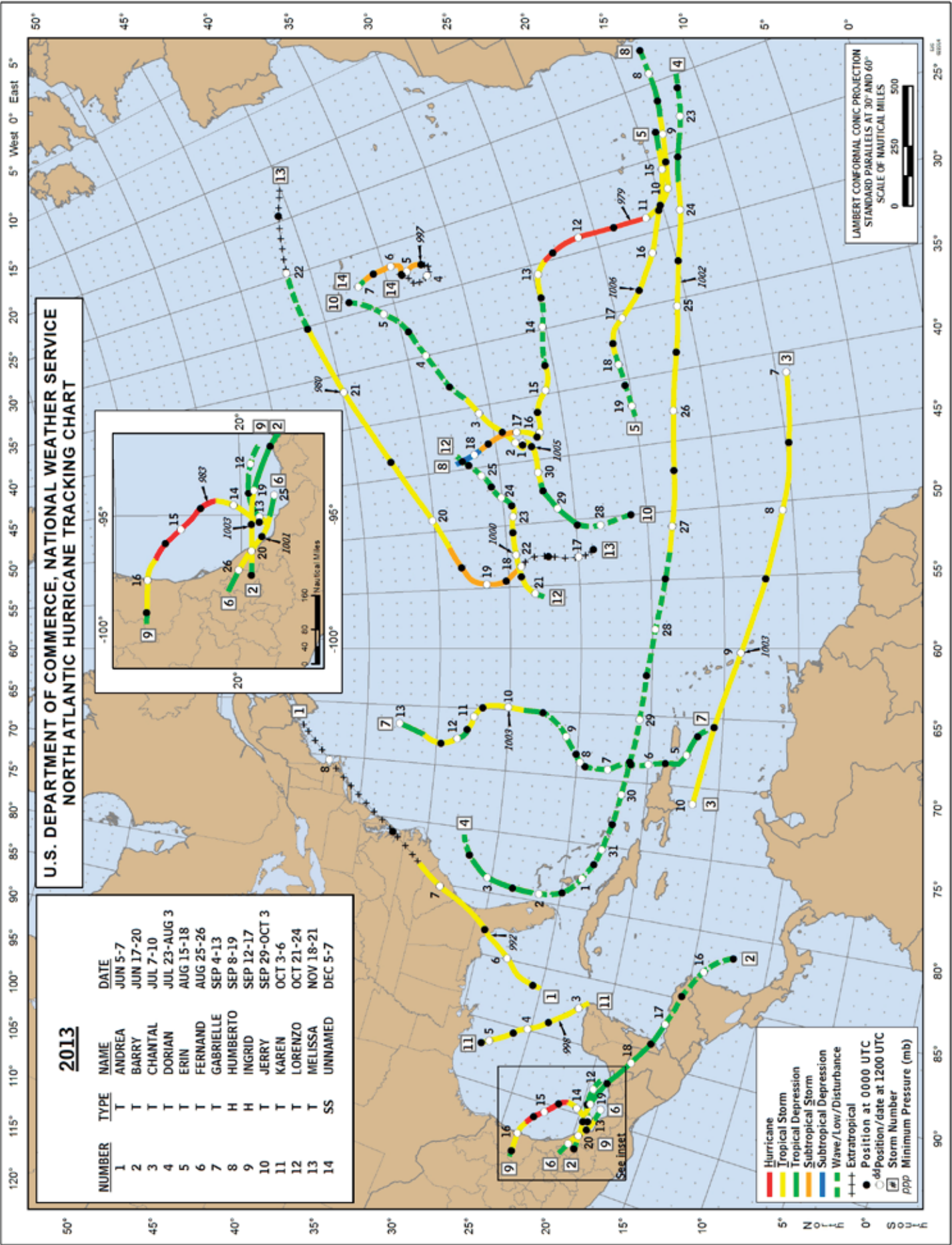
Although there were many named storms, most of these were weak and short lived. The number of hurricanes (2) was the fewest since 1982. By another measure which takes into account the intensity and duration, 2003 was the 10<sup>th</sup> least active season since 1950. Yet the pre-season and mid-season outlooks were predicting an above normal and potentially a very active season (Table 1). The active prediction was based on warm tropical ocean temperatures, the lack of El Nino, and being in an active part of a longer term cycle.

	Named Storms	Hurricanes	Major Hurricanes (Cat 3+)
NOAA outlook May 23 <sup>rd</sup> , 2013	13 to 20	7 to 11	3 to 6
NOAA Outlook August 8 <sup>th</sup> , 2013	13 to 19	6 to 9	3 to 5
What Occurred	14	2	0

So why was the forecast off? This is currently being researched but it appears that there was dry and warm air aloft and increased shear in the regions that hurricanes typically develop during the hurricane season. These effects offset the warm ocean waters and other patterns that were seemingly favorable for development. Unfortunately the dry air aloft and increased shear were due to patterns that are unpredictable in advance of the season.

<sup>1</sup> Jack Beven, National Hurricane Center Tropical Cyclone Report, Tropical Storm Andrea, [http://www.nhc.noaa.gov/data/tcr/AL012013\\_Andrea.pdf](http://www.nhc.noaa.gov/data/tcr/AL012013_Andrea.pdf) (22 August 2013)

<sup>2</sup> Jack Beven, National Hurricane Center Tropical Cyclone Report, Hurricane Ingrid, [http://www.nhc.noaa.gov/data/tcr/AL102013\\_Ingrid.pdf](http://www.nhc.noaa.gov/data/tcr/AL102013_Ingrid.pdf) (5 February 2014)





# Emergency Management Contacts

## AUSTIN

- **County Emergency Management**  
979-865-5911

## BRAZORIA

- **County Emergency Management**  
979-864-1201  
[www.readybrazoria.us](http://www.readybrazoria.us)

- **Alvin**  
281-388-4363
- **Angleton**  
979-849-2383
- **Bailey's Prairie**  
979-849-0134
- **Brazoria**  
979-798-2489
- **Brookside**  
281-997-9777
- **Clute**  
979-265-6194
- **Danbury**  
979-822-1551
- **Freeport**  
979-239-1211
- **Hillcrest Village**  
281-748-7149
- **Jones Creek**  
979-233-3091
- **Lake Jackson**  
979-415-2500
- **Liverpool**  
281-581-2342
- **Manvel**  
281-814-3233
- **Oyster Creek**  
979-233-8481
- **Pearland**  
281-997-4650  
[cityofpearland.com/preparedness](http://cityofpearland.com/preparedness)

- **Richwood**  
979-265-8157

- **Surfside**  
979-239-1151

- **Sweeney**  
979-548-3321

- **Quintana**  
979-233-0848

- **West Columbia**  
979-345-5121

## BRAZOS

- **County Emergency Management**  
979-821-1030  
[www.bcdem.org](http://www.bcdem.org)

- **Bryan**  
979-821-1030  
[www.bryantx.gov](http://www.bryantx.gov)

- **College Station**  
979-764-5210  
[www.cstx.gov/dem](http://www.cstx.gov/dem)

## BURLESON

- **County Emergency Management**  
979-567-2008

## CHAMBERS

- **County Emergency Management**  
409-267-2445  
[www.co.chambers.tx.us](http://www.co.chambers.tx.us)

## COLORADO

- **County Emergency Management**  
979-733-0184

## FORT BEND

- **County Emergency Management**  
281-342-6185  
[www.fbcoem.org](http://www.fbcoem.org)

- **Arcola**  
281-431-0606

- **Beasley**  
979-387-2775

- **Fulshear**  
281-346-1796

- **Kendleton**  
832-439-1524

- **Meadows Place**  
281-983-2900

- **Missouri City**  
281-403-8500  
[www.missouricityready.com](http://www.missouricityready.com)

- **Needville**  
979-793-4255

- **Richmond**  
281-232-6871

- **Rosenberg**  
835-595-3700  
[www.ci.rosenberg.tx.us](http://www.ci.rosenberg.tx.us)

- **Simonton**  
281-496-0066

- **Stafford**  
281-261-3950

- **Sugar Land**  
281-275-2853  
[sugarlandresponds.com](http://sugarlandresponds.com)

- **Weston lakes**  
281-533-0907

# Emergency Management Contacts

## GALVESTON

- **County Emergency Management**  
888-384-2000  
[www.gcoem.org](http://www.gcoem.org)

- **Bayou Vista**  
409-935-0449

- **Clear Lake Shores**  
281-334-1034  
281-334-2799

- **Dickinson**  
281-337-4700

- **Friendswood**  
281-996-3335

- **Galveston**  
409-765-3710  
[www.cityofgalveston.org](http://www.cityofgalveston.org)

- **Hitchcock**  
409-986-5559  
[www.hitchcockpd.com](http://www.hitchcockpd.com)

- **Jamaica Beach**  
409-737-1142  
[www.ci.jamaicabeach.tx.us](http://www.ci.jamaicabeach.tx.us)

- **Kemah**  
281-334-5414

- **La Marque**  
409-938-9269  
[www.ci.la-marque.tx.us](http://www.ci.la-marque.tx.us)

- **League City**  
281-554-1000  
[www.leaguecity.com](http://www.leaguecity.com)

- **Santa Fe**  
409-925-3092

- **Texas City**  
409-643-5840

- **Tiki Island**  
409-935-1427

## GRIMES

- **County Emergency Management**  
936-873-4404

## HARRIS

- **County Emergency Management**  
713-881-3100  
[www.readyharris.org](http://www.readyharris.org)

- **Baytown**  
281-420-6556

- **Bellaire**  
713-662-8222

- **Deer Park**  
281-478-7298  
[www.deerparktx.gov](http://www.deerparktx.gov)

- **El Lago**  
281-326-5900

- **Galena Park**  
713-672-2556

- **Houston**  
713-884-4500  
[www.houstonoem.org](http://www.houstonoem.org)

- **Jacinto City**  
713-674-8424

- **Humble**  
281-446-4928

- **Jersey Village**  
713-466-2100

- **Katy**  
281-391-3500  
[www.cityofkaty.com](http://www.cityofkaty.com)

- **La Porte**  
281-470-0010  
[www.lpoem.org](http://www.lpoem.org)

- **Morgan's Point**  
281-471-2171

- **Nassau Bay**  
281-336-6298

- **Pasadena**  
713-475-5588

- **Seabrook**  
281-291-5700

- **Shoreacres**  
281-471-2244

- **South Houston**  
713-947-7700

- **Taylor Lake Village**  
281-326-2843

- **Tomball**  
281-290-1301

- **Webster**  
281-332-1826

## JACKSON

- **County Emergency Management**  
361-782-3398  
[www.co.jackson.tx.us](http://www.co.jackson.tx.us)

- **Edna**  
361-782-3122

- **Ganado**  
361-771-2800



# Emergency Management Contacts

## LIBERTY

- **County Emergency Management**

936-334-3219

[www.co.liberty.tx.us](http://www.co.liberty.tx.us)

- **Cleveland**  
281-592-2667
- **Dayton**  
936-258-7621
- **Liberty**  
936-336-8118

## Madison

- **County Emergency Management**

936-348-3810

[www.co.madison.tx.us](http://www.co.madison.tx.us)

## MATAGORDA

- **County Emergency Management**

979-323-0707

[www.co.matagorda.tx.us](http://www.co.matagorda.tx.us)

## MONTGOMERY

- **County Emergency Management**

936-523-3901

[www.mctxoem.org](http://www.mctxoem.org)

- **Conroe**  
936-522-3200
- **Shenandoah**  
281-367-8952

## POLK

- **County Emergency Management**

936-327-6826

[www.oem.polk.tx.us](http://www.oem.polk.tx.us)

## SAN JACINTO

- **County Emergency Management**

936-653-3395

[www.co.san-jacinto.tx.us](http://www.co.san-jacinto.tx.us)

## WALKER

- **County Emergency Management**

936-435-2418

[www.walker.tx.us](http://www.walker.tx.us)

## WALLER

- **County Emergency Management**

979-826-8282

## WASHINGTON

- **County Emergency Management**

979-337-1412

- **Brenham**  
979-337-7300

## WHARTON

- **County Emergency Management**

979-532-1123

[co.wharton.tx.us](http://co.wharton.tx.us)

- **El Campo**  
979-543-5311

- **Wharton**  
979-532-3131

[www.cityofwharton.com](http://www.cityofwharton.com)

## US Department of Homeland Security

[www.ready.gov](http://www.ready.gov)

## Red Cross

[www.redcross.org](http://www.redcross.org)

National - 800-733-2767

Gulf Coast Assistance Line 866-526-8300

## FEMA

[www.fema.gov](http://www.fema.gov)

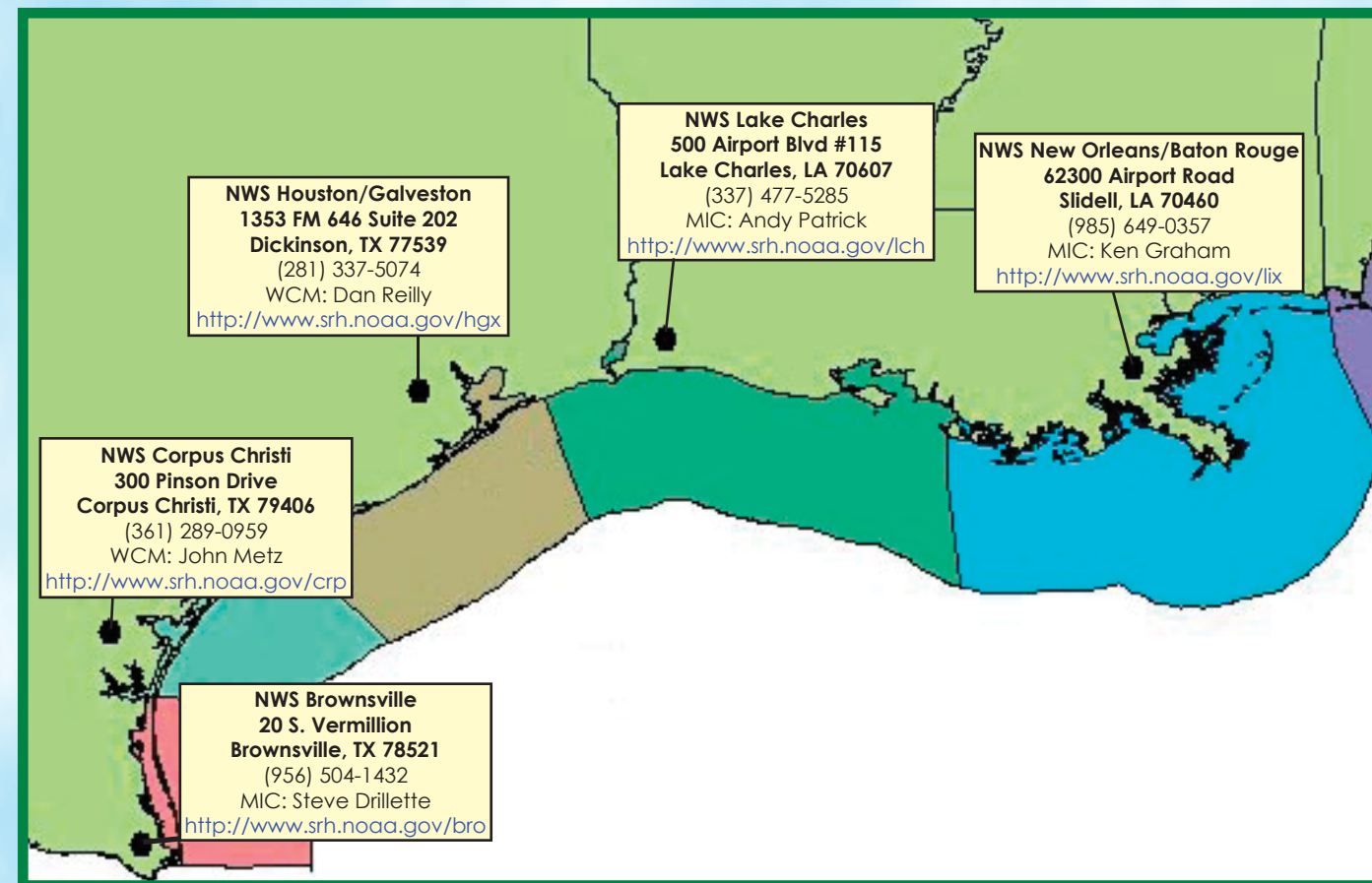
## Weather Research Center

[www.wxresearch.org](http://www.wxresearch.org)

**Community Resource Information:  
Do Not Call 911 for Non-Emergencies!**



# Regional National Weather Service Offices



American Red Cross

**Whatever comes your way,  
you'll know what to do.**

**Red Cross mobile apps  
put help in your hand.**



First Aid App



Hurricane App



Earthquake App



Wildfire App



Tornado App



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